



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 06:00 AM GMT

PDB ID : 2VFX  
Title : STRUCTURE OF THE SYMMETRIC MAD2 DIMER  
Authors : Yang, M.; Li, B.; Liu, C.-J.; Tomchick, D.R.; Machius, M.; Rizo, J.; Yu, H.; Luo, X.  
Deposited on : 2007-11-05  
Resolution : 1.95 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.  
We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

---

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

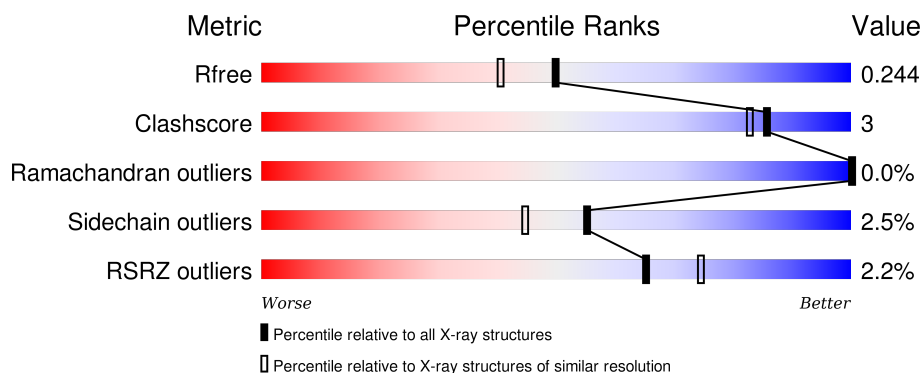
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.95 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	91344	1833 (1.96-1.96)
Clashscore	102246	1953 (1.96-1.96)
Ramachandran outliers	100387	1936 (1.96-1.96)
Sidechain outliers	100360	1936 (1.96-1.96)
RSRZ outliers	91569	1835 (1.96-1.96)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	206	<div> <div>2%</div> <div>92%</div> <div>6%</div> </div>
1	B	206	<div> <div>%</div> <div>91%</div> <div>7%</div> </div>
1	C	206	<div> <div>4%</div> <div>94%</div> <div>5%</div> </div>
1	D	206	<div> <div>4%</div> <div>87%</div> <div>11%</div> </div>
1	E	206	<div> <div>%</div> <div>93%</div> <div>6%</div> </div>

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Length	Quality of chain	
1	F	206		89% 9% ..
1	G	206		90% 8% .
1	H	206		91% 7% ..
1	I	206		88% 9% ..
1	J	206		91% 6% ..
1	K	206		91% 8%
1	L	206		90% 8% .

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	CL	C	1208	-	-	-	X
3	CL	D	1209	-	-	-	X
5	PE3	F	1208	-	-	-	X
5	PE3	H	3104	-	-	-	X

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 21651 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	203	Total	C	N	O	S	0	3	0
			1652	1055	271	322	4			
1	B	203	Total	C	N	O	S	0	3	0
			1652	1054	272	323	3			
1	C	203	Total	C	N	O	S	0	3	0
			1652	1055	271	322	4			
1	D	202	Total	C	N	O	S	0	7	0
			1681	1075	275	327	4			
1	E	206	Total	C	N	O	S	0	4	0
			1685	1073	277	331	4			
1	F	203	Total	C	N	O	S	0	1	0
			1640	1049	269	318	4			
1	G	203	Total	C	N	O	S	0	4	0
			1663	1065	273	322	3			
1	H	203	Total	C	N	O	S	0	1	0
			1638	1047	269	319	3			
1	I	202	Total	C	N	O	S	0	3	0
			1647	1053	270	320	4			
1	J	201	Total	C	N	O	S	0	5	0
			1667	1065	277	322	3			
1	K	206	Total	C	N	O	S	0	4	0
			1685	1074	276	332	3			
1	L	203	Total	C	N	O	S	0	2	0
			1647	1053	271	320	3			

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
A	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
A	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
B	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
B	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
B	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
C	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
C	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
C	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
D	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
D	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
D	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
E	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
E	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
E	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
F	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
F	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
F	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
G	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
G	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
G	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
H	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
H	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
H	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
I	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
I	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
I	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
J	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
J	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
J	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
K	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
K	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
K	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257
L	13	ALA	LEU	ENGINEERED MUTATION	UNP Q13257
L	79	SER	CYS	ENGINEERED MUTATION	UNP Q13257
L	106	SER	CYS	ENGINEERED MUTATION	UNP Q13257

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	G	1	Total Mg 1 1	0	0
2	K	1	Total Mg 1 1	0	0
2	E	1	Total Mg 1 1	0	0

*Continued on next page...*

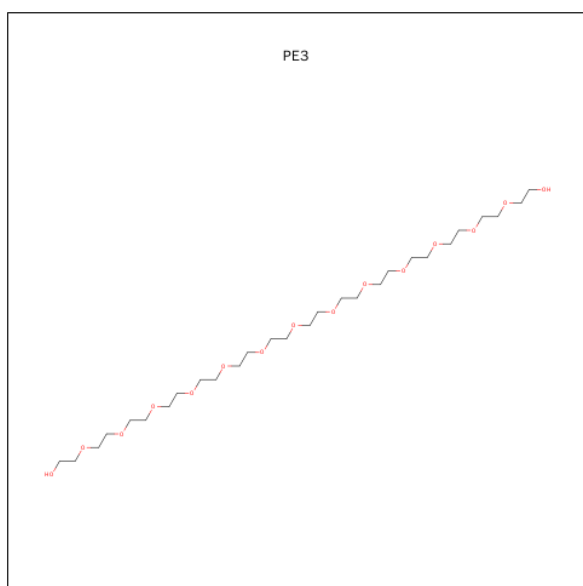
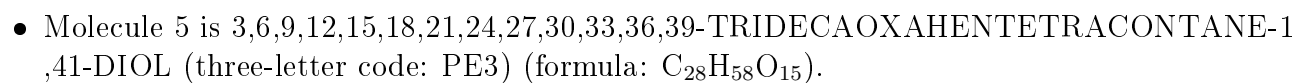
*Continued from previous page...*

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total 1	Mg 1	0	0
2	C	1	Total 1	Mg 1	0	0
2	A	1	Total 1	Mg 1	0	0
2	L	1	Total 1	Mg 1	0	0
2	F	1	Total 1	Mg 1	0	0

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

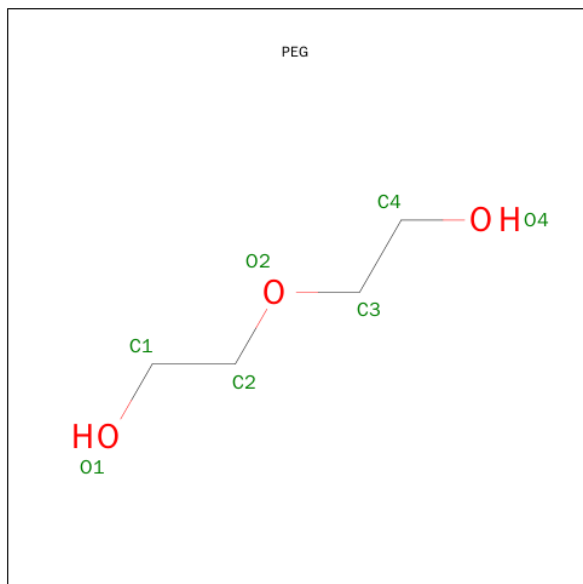
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	G	1	Total 1	Cl 1	0	0
3	J	5	Total 5	Cl 5	0	0
3	D	5	Total 5	Cl 5	0	0
3	K	2	Total 2	Cl 2	0	0
3	E	5	Total 5	Cl 5	0	0
3	B	4	Total 4	Cl 4	0	0
3	I	4	Total 4	Cl 4	0	0
3	C	3	Total 3	Cl 3	0	0
3	A	3	Total 3	Cl 3	0	0
3	L	3	Total 3	Cl 3	0	0
3	F	2	Total 2	Cl 2	0	0

- Molecule 4 is 2-{2-[2-(2-{2-[2-(2-ETHOXY-ETHOXY)-ETHOXY]-ETHOXY}-ETHOXY)-ETHOXY]-ETHOXY}-ETHANOL (three-letter code: PE4) (formula: C<sub>16</sub>H<sub>34</sub>O<sub>8</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			10	6	4		
5	C	1	Total	C	O	0	0
			10	6	4		
5	F	1	Total	C	O	0	0
			10	6	4		
5	G	1	Total	C	O	0	0
			10	6	4		
5	H	1	Total	C	O	0	0
			10	6	4		
5	K	1	Total	C	O	0	0
			10	6	4		

- Molecule 6 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula:  $C_4H_{10}O_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	I	1	Total	C	O	0	0
			7	4	3		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	145	Total	O	0	0
			145	145		
7	B	133	Total	O	0	0
			133	133		
7	C	121	Total	O	0	0
			121	121		

*Continued on next page...*



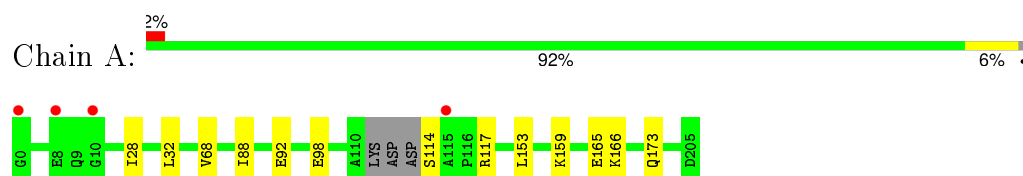
*Continued from previous page...*

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	D	140	Total 140	O 140	0	0
7	E	131	Total 131	O 131	0	0
7	F	131	Total 131	O 131	0	0
7	G	130	Total 130	O 130	0	0
7	H	118	Total 118	O 118	0	0
7	I	138	Total 138	O 138	0	0
7	J	136	Total 136	O 136	0	0
7	K	140	Total 140	O 140	0	0
7	L	128	Total 128	O 128	0	0

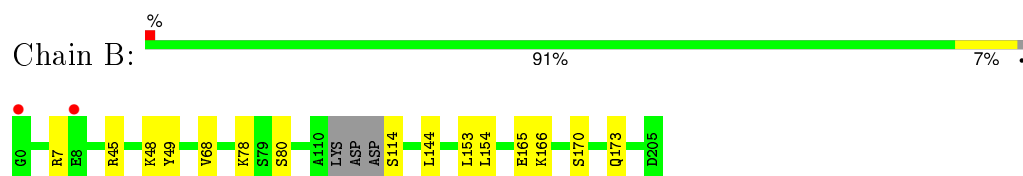
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

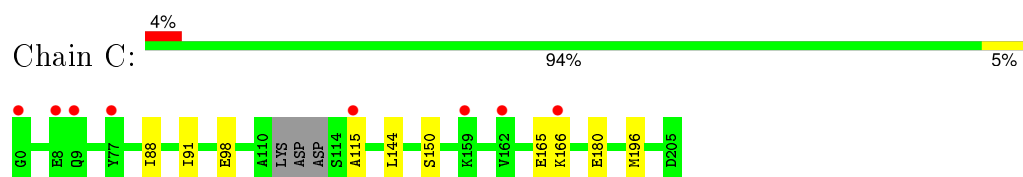
- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A



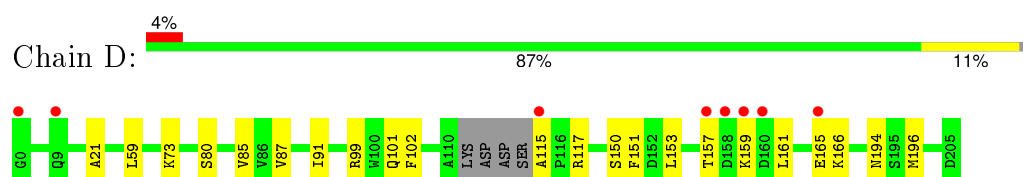
- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A



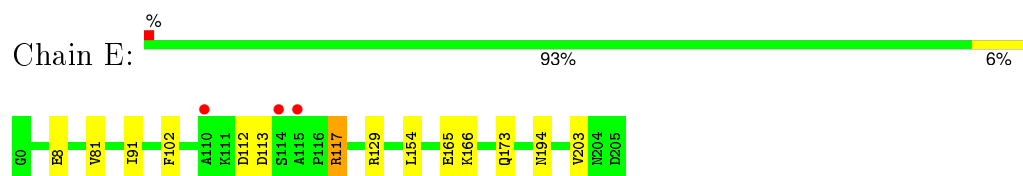
- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A



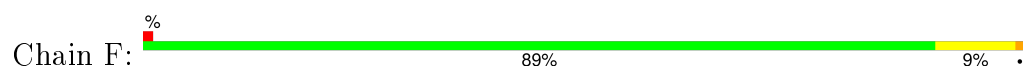
- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A

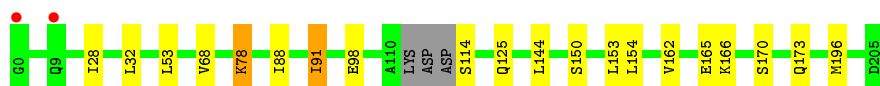


- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A

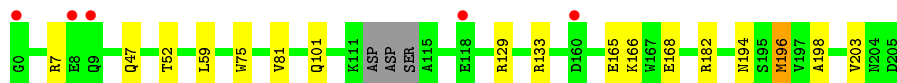
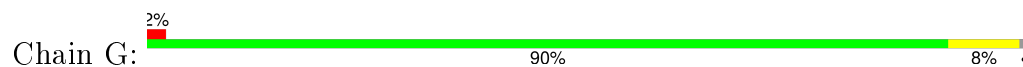


- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A

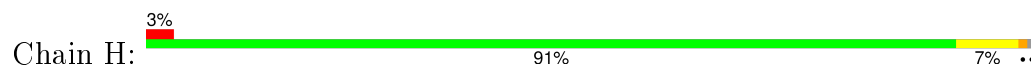




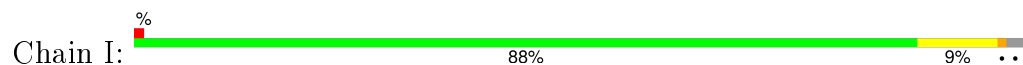
- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A



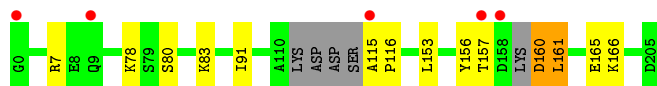
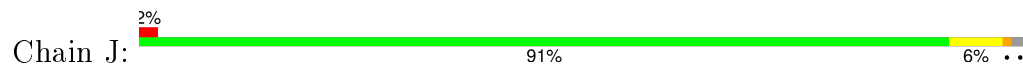
- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A



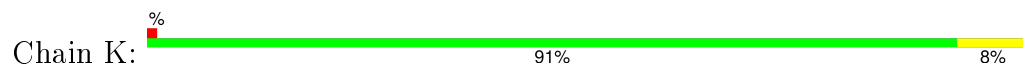
- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A



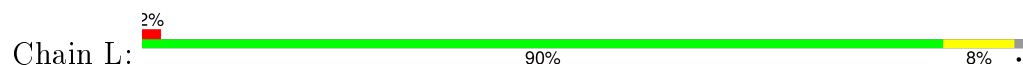
- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A



- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A



- Molecule 1: MITOTIC SPINDLE ASSEMBLY CHECKPOINT PROTEIN MAD2A



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	109.34Å 191.41Å 154.31Å 90.00° 90.02° 90.00°	Depositor
Resolution (Å)	45.00 – 1.95 45.38 – 1.95	Depositor EDS
% Data completeness (in resolution range)	97.3 (45.00-1.95) 97.2 (45.38-1.95)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.93 (at 1.95Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, $R_{free}$	0.208 , 0.247 0.207 , 0.244	Depositor DCC
$R_{free}$ test set	2700 reflections (1.22%)	DCC
Wilson B-factor (Å <sup>2</sup> )	23.1	Xtriage
Anisotropy	0.324	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 30.3	EDS
Estimated twinning fraction	0.000 for -1/2*h-1/2*k,-3/2*h+1/2*k,-l 0.000 for -1/2*h+1/2*k,3/2*h+1/2*k,-l 0.000 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.000 for 1/2*h+1/2*k,3/2*h-1/2*k,-l 0.478 for h,-k,-l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	10 of 223427 reflections (0.004%)	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	21651	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 51.06 % of the origin peak, indicating pseudo translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 5.9210e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup> Intensities estimated from amplitudes.

<sup>2</sup> Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: PE4, MG, PE3, PEG, CL

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z  > 5$	RMSZ	# $ Z  > 5$
1	A	0.51	0/1679	0.69	0/2272
1	B	0.55	0/1679	0.71	0/2273
1	C	0.52	0/1679	0.69	0/2272
1	D	0.53	0/1709	0.73	0/2314
1	E	0.53	0/1713	0.69	0/2319
1	F	0.54	0/1667	0.69	0/2256
1	G	0.53	0/1690	0.70	0/2287
1	H	0.52	0/1665	0.67	0/2254
1	I	0.52	0/1674	0.71	1/2266 (0.0%)
1	J	0.53	0/1694	0.74	0/2292
1	K	0.57	1/1713 (0.1%)	0.69	0/2320
1	L	0.54	0/1674	0.72	0/2265
All	All	0.53	1/20236 (0.0%)	0.70	1/27390 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	H	1	0

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	K	8	GLU	CD-OE2	8.10	1.34	1.25

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	I	161	LEU	CA-CB-CG	6.83	131.02	115.30

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	H	115	ALA	CA

There are no planarity outliers.

## 5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1652	0	1670	4	0
1	B	1652	0	1667	9	0
1	C	1652	0	1670	4	0
1	D	1681	0	1695	18	0
1	E	1685	0	1697	6	0
1	F	1640	0	1662	8	0
1	G	1663	0	1690	12	0
1	H	1638	0	1658	11	0
1	I	1647	0	1667	12	0
1	J	1667	0	1681	11	1
1	K	1685	0	1697	12	0
1	L	1647	0	1670	12	1
2	A	1	0	0	0	0
2	B	1	0	0	0	1
2	C	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	K	1	0	0	0	0
2	L	1	0	0	0	0
3	A	3	0	0	0	0
3	B	4	0	0	0	0
3	C	3	0	0	1	0
3	D	5	0	0	0	0
3	E	5	0	0	0	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	F	2	0	0	0	0
3	G	1	0	0	0	0
3	I	4	0	0	0	0
3	J	5	0	0	0	0
3	K	2	0	0	0	0
3	L	3	0	0	0	0
4	A	13	0	17	0	0
4	E	13	0	17	0	0
4	L	13	0	17	0	0
5	B	10	0	13	0	0
5	C	10	0	13	0	0
5	F	10	0	13	0	0
5	G	10	0	13	0	0
5	H	10	0	13	0	0
5	K	10	0	13	0	0
6	I	7	0	10	0	0
7	A	145	0	0	0	0
7	B	133	0	0	0	0
7	C	121	0	0	1	0
7	D	140	0	0	6	0
7	E	131	0	0	1	0
7	F	131	0	0	1	0
7	G	130	0	0	3	0
7	H	118	0	0	1	0
7	I	138	0	0	0	0
7	J	136	0	0	1	0
7	K	140	0	0	2	0
7	L	128	0	0	1	0
All	All	21651	0	20263	113	2

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

The worst 5 of 113 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:115:ALA:HB1	1:H:116:PRO:CD	2.07	0.85
1:D:101[A]:GLN:NE2	7:D:2071:HOH:O	2.11	0.83
1:J:157[B]:THR:HG21	1:J:161:LEU:HD13	1.61	0.82
1:D:101[A]:GLN:OE1	7:D:2074:HOH:O	2.00	0.78
1:H:115:ALA:HB1	1:H:116:PRO:HD3	1.66	0.78

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:1206:MG:MG	2:B:1206:MG:MG[2_656]	1.48	0.72
1:J:7[A]:ARG:NH2	1:L:38:TYR:OH[4_645]	2.16	0.04

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	202/206 (98%)	199 (98%)	3 (2%)	0	100	100
1	B	202/206 (98%)	198 (98%)	4 (2%)	0	100	100
1	C	202/206 (98%)	197 (98%)	4 (2%)	1 (0%)	34	21
1	D	205/206 (100%)	200 (98%)	5 (2%)	0	100	100
1	E	208/206 (101%)	206 (99%)	2 (1%)	0	100	100
1	F	200/206 (97%)	197 (98%)	3 (2%)	0	100	100
1	G	203/206 (98%)	200 (98%)	3 (2%)	0	100	100
1	H	200/206 (97%)	197 (98%)	3 (2%)	0	100	100
1	I	201/206 (98%)	198 (98%)	3 (2%)	0	100	100
1	J	200/206 (97%)	198 (99%)	2 (1%)	0	100	100
1	K	208/206 (101%)	206 (99%)	2 (1%)	0	100	100
1	L	201/206 (98%)	198 (98%)	3 (2%)	0	100	100
All	All	2432/2472 (98%)	2394 (98%)	37 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	115	ALA



### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	189/189 (100%)	184 (97%)	5 (3%)	54	43
1	B	189/189 (100%)	185 (98%)	4 (2%)	61	53
1	C	189/189 (100%)	188 (100%)	1 (0%)	92	91
1	D	192/189 (102%)	187 (97%)	5 (3%)	54	43
1	E	193/189 (102%)	188 (97%)	5 (3%)	54	43
1	F	187/189 (99%)	178 (95%)	9 (5%)	31	15
1	G	190/189 (100%)	187 (98%)	3 (2%)	70	66
1	H	187/189 (99%)	180 (96%)	7 (4%)	41	27
1	I	188/189 (100%)	181 (96%)	7 (4%)	41	27
1	J	189/189 (100%)	185 (98%)	4 (2%)	61	53
1	K	193/189 (102%)	190 (98%)	3 (2%)	70	66
1	L	188/189 (100%)	183 (97%)	5 (3%)	52	41
All	All	2274/2268 (100%)	2216 (97%)	58 (3%)	55	43

5 of 58 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	170	SER
1	H	45	ARG
1	L	59	LEU
1	F	196[A]	MET
1	G	59	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	173	GLN
1	L	9	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 55 ligands modelled in this entry, 45 are monoatomic - leaving 10 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
4	PE4	A	1210	-	12,12,23	0.56	0	11,11,22	0.46	0
5	PE3	B	1210	-	9,9,42	0.63	0	8,8,41	0.50	0
5	PE3	C	1210	-	9,9,42	0.50	0	8,8,41	0.60	0
4	PE4	E	1210	-	12,12,23	0.63	0	11,11,22	0.54	0
5	PE3	F	1208	-	9,9,42	0.46	0	8,8,41	0.54	0
5	PE3	G	1208	-	9,9,42	0.73	0	8,8,41	0.55	0
5	PE3	H	3104	-	9,9,42	1.04	1 (11%)	8,8,41	1.02	0
6	PEG	I	1209	-	6,6,6	0.61	0	5,5,5	0.42	0
5	PE3	K	1209	-	9,9,42	0.64	0	8,8,41	0.44	0
4	PE4	L	1209	-	12,12,23	0.69	0	11,11,22	0.33	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	PE4	A	1210	-	-	0/10/10/21	0/0/0/0
5	PE3	B	1210	-	-	0/7/7/40	0/0/0/0
5	PE3	C	1210	-	-	0/7/7/40	0/0/0/0
4	PE4	E	1210	-	-	0/10/10/21	0/0/0/0
5	PE3	F	1208	-	-	0/7/7/40	0/0/0/0
5	PE3	G	1208	-	-	0/7/7/40	0/0/0/0
5	PE3	H	3104	-	-	0/7/7/40	0/0/0/0
6	PEG	I	1209	-	-	0/4/4/4	0/0/0/0
5	PE3	K	1209	-	-	0/7/7/40	0/0/0/0
4	PE4	L	1209	-	-	0/10/10/21	0/0/0/0

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	H	3104	PE3	O34-C35	2.13	1.53	1.42

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	203/206 (98%)	0.21	4 (1%) 68 77	15, 20, 31, 46	0
1	B	203/206 (98%)	0.22	2 (0%) 84 89	18, 24, 35, 46	0
1	C	203/206 (98%)	0.26	8 (3%) 43 54	18, 24, 37, 46	0
1	D	202/206 (98%)	0.32	8 (3%) 42 53	18, 25, 34, 43	0
1	E	206/206 (100%)	0.18	3 (1%) 76 84	19, 25, 35, 44	0
1	F	203/206 (98%)	0.23	2 (0%) 84 89	19, 25, 35, 45	0
1	G	203/206 (98%)	0.22	5 (2%) 61 71	19, 24, 35, 48	0
1	H	203/206 (98%)	0.29	6 (2%) 54 64	18, 25, 37, 47	0
1	I	202/206 (98%)	0.23	3 (1%) 76 84	19, 25, 34, 45	0
1	J	201/206 (97%)	0.26	5 (2%) 61 71	18, 24, 33, 41	0
1	K	206/206 (100%)	0.25	3 (1%) 76 84	14, 21, 34, 46	0
1	L	203/206 (98%)	0.16	5 (2%) 61 71	14, 20, 31, 44	0
All	All	2438/2472 (98%)	0.24	54 (2%) 65 74	14, 24, 35, 48	0

The worst 5 of 54 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	0	GLY	6.5
1	K	0	GLY	5.6
1	C	115	ALA	4.2
1	H	0	GLY	3.9
1	K	9	GLN	3.9

### 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
3	CL	D	1209	1/1	1.00	0.16	5.03	23,23,23,23	0
5	PE3	H	3104	10/43	0.88	0.14	3.29	47,47,48,48	0
5	PE3	F	1208	10/43	0.84	0.16	3.07	51,52,53,53	0
3	CL	C	1208	1/1	0.99	0.17	2.23	24,24,24,24	0
4	PE4	E	1210	13/24	0.87	0.14	1.95	55,57,65,66	0
5	PE3	K	1209	10/43	0.85	0.13	1.92	50,53,54,55	0
4	PE4	A	1210	13/24	0.88	0.15	1.55	54,55,59,59	0
5	PE3	G	1208	10/43	0.85	0.12	1.14	52,53,53,54	0
6	PEG	I	1209	7/7	0.90	0.12	0.93	44,45,45,46	0
5	PE3	B	1210	10/43	0.92	0.12	0.27	55,56,56,56	0
4	PE4	L	1209	13/24	0.86	0.11	-0.09	52,53,55,55	0
5	PE3	C	1210	10/43	0.92	0.11	-0.14	49,49,51,52	0
3	CL	L	1208	1/1	0.99	0.10	-0.22	24,24,24,24	0
3	CL	B	1208	1/1	1.00	0.10	-0.40	24,24,24,24	0
3	CL	J	1208	1/1	0.99	0.08	-1.93	23,23,23,23	0
3	CL	E	1209	1/1	0.96	0.07	-2.05	59,59,59,59	0
3	CL	D	1210	1/1	0.99	0.05	-2.23	23,23,23,23	0
3	CL	K	1207	1/1	0.99	0.07	-2.58	25,25,25,25	0
3	CL	K	1208	1/1	0.99	0.07	-2.61	23,23,23,23	0
3	CL	E	3102	1/1	1.00	0.07	-2.81	17,17,17,17	0
3	CL	I	1208	1/1	0.99	0.05	-3.07	26,26,26,26	0
3	CL	D	1206	1/1	1.00	0.07	-3.59	17,17,17,17	0
3	CL	I	1207	1/1	0.99	0.06	-3.65	25,25,25,25	0
3	CL	G	1207	1/1	0.99	0.06	-3.81	26,26,26,26	0
3	CL	B	1207	1/1	0.99	0.04	-3.97	24,24,24,24	0
3	CL	L	1207	1/1	1.00	0.05	-3.98	19,19,19,19	0
3	CL	D	1207	1/1	0.99	0.04	-4.73	18,18,18,18	0
3	CL	A	1207	1/1	1.00	0.04	-4.90	18,18,18,18	0
3	CL	D	1208	1/1	0.99	0.07	-4.91	24,24,24,24	0
3	CL	J	1207	1/1	0.99	0.06	-5.17	23,23,23,23	0

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
3	CL	I	3103	1/1	1.00	0.04	-5.41	17,17,17,17	0
3	CL	B	1209	1/1	0.99	0.03	-5.47	26,26,26,26	0
3	CL	J	3104	1/1	1.00	0.07	-5.94	16,16,16,16	0
3	CL	E	1208	1/1	0.99	0.05	-6.04	25,25,25,25	0
3	CL	J	1206	1/1	1.00	0.06	-6.37	17,17,17,17	0
3	CL	I	1206	1/1	0.99	0.03	-6.56	18,18,18,18	0
3	CL	F	1207	1/1	0.99	0.05	-6.88	18,18,18,18	0
3	CL	B	3111	1/1	0.99	0.04	-6.99	19,19,19,19	0
3	CL	E	1207	1/1	0.99	0.04	-7.29	18,18,18,18	0
2	MG	L	1206	1/1	0.99	0.07	-	15,15,15,15	1
2	MG	E	1206	1/1	0.99	0.05	-	27,27,27,27	0
3	CL	J	3128	1/1	0.90	0.14	-	61,61,61,61	0
2	MG	F	1206	1/1	0.96	0.07	-	29,29,29,29	0
2	MG	G	1206	1/1	0.98	0.12	-	24,24,24,24	1
2	MG	C	1206	1/1	0.98	0.03	-	27,27,27,27	0
3	CL	C	1209	1/1	0.93	0.14	-	52,52,52,52	0
3	CL	E	3129	1/1	0.93	0.14	-	62,62,62,62	0
2	MG	A	1206	1/1	0.97	0.04	-	28,28,28,28	0
3	CL	A	1209	1/1	0.99	0.10	-	27,27,27,27	1
2	MG	K	1206	1/1	0.99	0.02	-	22,22,22,22	1
3	CL	L	3127	1/1	0.81	0.09	-	67,67,67,67	0
3	CL	C	1207	1/1	1.00	0.13	-	20,20,20,20	1
3	CL	F	3132	1/1	0.97	0.24	-	40,40,40,40	1
2	MG	B	1206	1/1	0.93	0.07	-	39,39,39,39	0
3	CL	A	1208	1/1	0.75	0.17	-	68,68,68,68	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.